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Outpatient (Same-day Discharge) versus Inpatient Parotidectomy: A Systematic Review and Meta-analysis

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Conflict of Interest

None

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Keypoints

- Parotidectomy is one of the most commonly performed operations in head and neck surgery with the majority currently performed as an inpatient procedure.
- In the current cost-conscious healthcare environment, outpatient parotidectomy is increasingly performed (with or without percutaneous drain) to allow better utilisation of hospital resources.
- No previous work has compared the outcomes of outpatient versus inpatient parotidectomy.
- This systematic review and meta-analysis shows that outpatient parotidectomy compares favourably to inpatient procedure in post-operative complications and readmission rates.

Abstract

Background

Parotidectomy is often performed as an inpatient procedure largely due to drain insertion; however, outpatient parotidectomy has increasingly become an attractive alternative for its shorter hospital stays and greater efficiency in cost-effectiveness.

Objective of review

To assess the safety and feasibility of outpatient (or same day discharge) parotidectomy compared to inpatient parotidectomy.

Type of review

Systematic review of the literature and meta-analysis, in accordance with the PRISMA guidelines.

Methods

Pubmed/Medline, Embase, CINAHL, Google Scholar, Web of Science, The Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL) were searched for articles published in English between 01/01/1990 to 05/10/2019. The Newcastle-Ottawa Scale was used for quality assessment and Review Manager 5.3 for meta-analyses.

Main Outcome Measures

Primary outcomes assessed were postoperative complications including bleeding/haematoma, surgical site infection, seroma and facial weakness. Secondary outcome was readmission rate.

Results:

Out of 445 studies identified, 6 were selected for systematic review. The overall quality of evidence was moderate. A total of 3664 patients were included (1646 in the outpatient group and 2018 in the inpatient group). Comparing the outpatient to inpatient cohorts, there were lower complications in outpatient groups though not statistically significant for haematoma (OR= 0.45; 95% CI= 0.11-1.92; p = 0.28), surgical site infection (OR = 0.88; 95%

CI = 0.46-1.69; $p = 0.70$), seroma (0.79; 95% CI = 0.21-3.03; $p = 0.74$), facial nerve weakness (OR 0.39; 95% CI = 0.14-1.08; $p = 0.07$) and hospital readmission (OR 0.58; 95% CI = 0.33-1.04; $p = 0.07$).

Conclusions:

Outpatient parotidectomy appears to be safe and compares favourably to inpatient procedure in post-operative complication and readmission rates.

1) Introduction

In the current cost-conscious healthcare environment, there is a continual impetus on increased efficiency in the utilisation of hospital resources, without compromising on the standard of care and patient satisfaction¹. Otorhinolaryngology is no exception and many head and neck procedures are performed on an outpatient basis, including thyroidectomy^{2,3}, sinonasal surgery⁴ and adenotonsillectomy⁵. Parotidectomy is one of the most commonly performed operations in head and neck surgery with the majority currently performed as an inpatient procedure. The use of percutaneous drains post-operatively has become standard practice to reduce complications that may occur as a consequence of the rich vascular supply of the parotid gland and potential post-incisional salivary leakage⁶⁻⁸. Drains are usually kept in place for at least 24 hours, depending on drainage output and the surgeon's preference⁹. Post-operative drain usage has been suggested to be the biggest factor in determining the length of hospitalization following parotidectomy by Mofle *et al*⁷, with an average inpatient stay of 1.5 days per patient. The average duration of drainage in uncomplicated head and neck operations is between 2-4 days⁸. However, there is no clear evidence that neck drains significantly improve outcomes in head and neck procedures^{1,10,11}. Our study is the first systematic review to describe the safety and feasibility of outpatient parotidectomy compared to their inpatient counterparts.

2) Methods

The study was reported in compliance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement for systematic reviews and meta-analyses¹².

2.1 Ethical Consideration

There was no ethical approval required for this review as no patients were directly involved. A systematic search and review protocol was registered on Prospective Register of Systematic Reviews database (CRD42019120778).

2.2 Literature Review

The bibliographic databases, Pubmed/Medline, Embase, CINAHL, Google Scholar, Web of Science, The Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL), were independently searched for relevant articles from 01/01/1990 to 05/10/2019 by two of the authors. The search terms parotidectomy, parotid surgery, daycase, daycare, day surgery, same day surgery, outpatient, ambulatory care and ambulatory surgical procedure, were used in various combinations (Appendix S1). Further relevant publications were identified by hand searching papers on the subject, from the reference lists of articles obtained, and from Google Scholar.

2.3 Eligibility Criteria & Outcome Measures

All publications written in English with adult patients (>18 year old) who had parotidectomy both as outpatient (or same day) and inpatient procedure were considered. Outpatient or same day parotidectomy was defined as a procedure where patients were allowed to go home on the same day of the surgery, whereas inpatient parotidectomy was defined as a procedure where patients had at least one night stay in hospital postoperatively. Primary articles with both inpatient and outpatient parotidectomy groups were included (Table 1). Review articles, expert opinions or commentaries and studies that did not contain outpatient and inpatient parotidectomy groups were excluded.

The primary outcome measures were postoperative complications including bleeding/haemorrhage/haematoma, wound infection, seroma, facial weakness/paralysis and Frey's syndrome, whereas the secondary outcome was the readmission rates. A postoperative complication was defined as an event that developed within 30 days of the procedure and occurred as a direct result of the surgery.

2.4 Data Collection and Analysis

All relevant titles and abstracts were screened independently by five assessors (SF, SH, AL, PM & ZL) and duplicates were removed. The full-text articles for all abstracts shortlisted by at least one assessor were obtained. Based on the criteria outlined in Table 1, these articles were further scrutinised by two of the authors (SF and SH) to determine the eligibility for inclusion. Any discrepancies encountered were discussed and consensus was reached at regular meetings of the investigators.

Data from eligible studies were independently extracted and entered into a computerised spreadsheet by two of the authors (SF and SH). This included the first author's name, publication year, study design, number of patients in the outpatient and inpatient groups, age, sex ratio, ASA, length of stay for the inpatient group, patient satisfaction score if available and primary outcomes as outlined above.

The level of evidence was determined according to the guidelines published by the Oxford Centre for Evidence-based Medicine.¹³ In addition, the Newcastle-Ottawa Scale (NOS) tool was used for quality assessment and only articles that scored above five were used for the subsequent meta-analysis. The NOS tool is suitable for non-randomised studies, including case-control and cohort studies.¹⁴

2.5 Data synthesis and statistical analysis

Statistical meta-analysis was conducted on the selected studies with an odds ratio (OR) and 95% CI comparing an outpatient (experimental) and an inpatient (control) group using the Cochrane Review Manager 5.3. The Mantel-Haenszel statistical method was used, as well as a random effects model for analyses to create forest and funnel plots. The risks of complications between the outpatient and inpatient groups were compared. Dichotomous data was chosen as the outcome data type. In order to test heterogeneity, the τ^2 value, I^2 value and Chi-squared tests were used. The τ^2 value is used to estimate the heterogeneity of variance between studies while assuming a distribution for this variance. The I^2 value is used to assess the impact of heterogeneity above chance for the final meta-analyses results, a larger percentage of I^2 value representing greater heterogeneity between studies. The Chi-squared value provides a test of heterogeneity, indicating whether there are differences in heterogeneity between the compared studies.

3) Results

3.1 Study Selection

A total of 445 articles were identified in our initial search, of which 62 articles were provisionally selected and full reports of the relevant manuscripts were retrieved. Of these, 56 articles failed to meet the inclusion criteria and were excluded at the data extraction stage. The remaining 6 articles met the inclusion criteria to undergo a systematic review (Figure 1). Of these, 5 were selected for the meta-analysis and 1 article¹⁵ (Steckler *et al.*) was excluded. The latter was because it was not possible to separate the outpatient and inpatient groups data from the outcomes reported. The workflow is illustrated in Figure 1.

3.2 Study Characteristics

In total, 3664 patients were included. Of these, 1646 were in the outpatient group and 2018 were in the inpatient group. Table 2 summarises the demographic data and characteristics of the studies included in the systematic review. **Notably, the mean age in both the outpatient and inpatient groups across the studies was similar, not only in the matched study (Coniglio *et al.*¹⁷), but also in those which were not matched (Ziegler *et al.*²⁰, Van Horn *et al.*¹⁹, Bentkover *et al.*¹⁸ and Steckler *et al.*¹⁵).** The majority of patients either had a superficial or total parotidectomy performed. None of the studies included cases that involved neck dissection or extended parotidectomy. Table 3 provides the outcome measures from each study.

3.2.1 Risks of bias in included studies

Based on the Newcastle-Ottawa scale, the quality of the methodology used in each study was assessed and included in Table 2. 3 out of the 6 studies had a score of 8 on the scale (maximum score = 9). Amongst these, the largest series (n = 4368) was conducted by Siddiqui *et al.*¹⁶ which evaluated, in a multi-institutional setting, differences in the outcome of patients undergoing inpatient (n = 1453) or outpatient (n = 2915) parotidectomy between 2005 and 2014. In this retrospective analysis, in order to minimise any confounding effects, the propensity matching of patients was utilised, to yield a cohort of 1352 cases in each group with no variability in co-morbidities. **Although the mean age for each cohort was not specifically reported in this study, it is likely that the age factor was incorporated in the**

propensity scoring to produce the matched cohorts. Similarly, to reduce confounders, Coniglio *et al.*¹⁷ also matched a group of inpatients to the outpatient group, using pre-specified criteria of age and sex.

3.2.2 Meta-analyses of the outcomes

Five studies were included in the meta-analysis of outcomes, which included readmission rates and post-operative complications including haematoma, seroma, surgical site infection and facial nerve injury. Siddiqui *et al.*¹⁶ was the largest study that was weighted most heavily in the meta-analysis. The other four papers were considerably smaller studies and had lesser weightage. On comparing the five papers with Chi² test, there was no significant difference (p=0.61), but the power of this test was low.

3.3 Outcomes of studies

Haematoma

The development of a haematoma was reported in four studies, except Bentkover *et al.*¹⁸. There were 4 patients who developed a haematoma in 1583 patients in the outpatient group, compared to 37 patients in the 1995 patients in the inpatient group. Not all haematoma cases required surgical intervention for evacuation. Both Van Horn *et al.*¹⁹ and Ziegler *et al.*²⁰ reported a higher rate of haematoma in the inpatient compared to the outpatient groups. Coniglio *et al.*¹⁷ claimed that none of their patients developed a haematoma, although reported a higher mean of intraoperative blood loss in the inpatient group compared to the outpatient group (34.9ml versus 16.9ml). Overall, the risk of developing haematoma was lower in the outpatient cohort when compared to the inpatient cohort (pooled OR = 0.45; 95% CI = 0.11 to **1.92**; $p = 0.28$). (Figure 2)

Surgical Site Infection

Wound infection was reported in three studies. There were 29 cases with surgical site infections in 1484 patients in the outpatient group and 49 in 1879 patients in the inpatient group. There was no statistically significant difference between the groups (pooled OR = 0.88; 95% CI = 0.46 to 1.69; $p = 0.70$). (Figure 3)

Seroma

Postoperative seroma was reported in four studies, except Siddiqui *et al.*¹⁶. Among these, two studies reported a higher rate of seroma formation in their inpatient group, whereas the other two observed the opposite. Although none of the studies had routinely tested for amylase level from the fluids in the seroma to confirm a sialocoele, this represents a common clinical practice as the management for both conditions tend not to differ. There were a total of 12 cases with seroma in 250 patients in the outpatient group compared to 34 cases in 656 patients in the inpatient group. Van Horn *et al.*¹⁹ is the only study that produced a statistically significant difference, with a lower rate of seroma formation observed in the outpatient group. However, on pooling the data for analysis, there was no statistically significant difference between the groups (pooled OR = 0.79; 95% CI = 0.21 to 3.03; $p = 0.74$). (Figure 4)

Facial weakness

Facial weakness was reported in three studies. None of the studies had specified the extent or degree of weakness observed and the follow-up period varied. Specifically, Coniglio *et al.*¹⁷ reported 7.1% of patients in the outpatient group developed facial nerve paresis, all of which resolved within 6 months, compared to 16.3% in the inpatient group. Bentkover *et al.*¹⁸ mentioned no permanent facial nerve paralysis in the outpatient group and 11% with temporal facial nerve paralysis. In the inpatient group, 15% had a permanent facial nerve paralysis and 8% a temporary paralysis. Van Horn *et al.*¹⁹ reported that facial nerve injury occurred in 1% of outpatient parotidectomies and in 2.6% of inpatient parotidectomies where the facial nerve had to be sacrificed. Nonetheless, given the odds ratio for each paper were almost identical at 0.39 ($\text{Tau}^2 = 0.00$, $\text{Chi}^2 = 0.00$, $\text{df} = 2$ ($p = 1.00$); $I^2 = 0\%$), this means the outpatient group is less likely to develop facial weakness compared to the inpatient group. There was however, no statistically significant difference between the groups (pooled OR = 0.39; 95% CI = 0.14 to 1.08; $p = 0.07$). (Figure 5)

Frey's syndrome

Two studies reported the incidence of Frey's syndrome in their cohorts. Coniglio *et al.*¹⁷ reported 0% in both groups whereas Bentkover *et al.*¹⁸ reported one inpatient developed the complication and none in its outpatient group.

Readmission

Readmissions were reported in two papers and these were due to various postoperative concerns. Siddique *et al.*¹⁶ reported 1.3% of the outpatient cohort and 2.2% of the inpatient were readmitted. On the other hand, Ziegler *et al.*²⁰ reported no readmission from the outpatient group but 1.4% from the inpatient group. Overall, there was no statistical difference between the two groups (pooled OR = 0.58; 95% CI = 0.33 to 1.04; $p = 0.07$). (Figure 6)

4) Discussion

4.1 Summary of main results

Our results showed that outpatient parotidectomy has comparable outcomes to the inpatient procedure, with no statistically significant differences in the post-operative complications including haematoma, surgical site infections, seroma, facial weakness as well as the readmission rates.

4.2 Overall completeness, quality and applicability of evidence

Due to the lack of randomized controlled trials, our study represents a systematic review of cohort studies. Based on the Oxford Centre for Evidence-Based Medicine (OCEBM), this provides a level 2a evidence.

To our knowledge, this is the first systematic review and meta-analysis comparing the outcomes between outpatient and inpatient parotidectomy.

4.3 Potential biases in review

The articles identified in our literature search were predominantly retrospective case studies with small sample sizes and the majority of them conducted at single institutions. Limitations in their design include the retrospective nature of the studies, potential selection bias, reporting bias and failure to account for confounding factors, apart from the two matched studies. Furthermore, as the techniques and methods of parotidectomy evolve over the years, this could also lead to information bias.

It was worth noting that all six studies included in our review were from the *USA*. Siddique *et al.*, in particular, was a retrospective analysis of parotidectomies from the American College of Surgeons National Surgical Quality Improvement Program database (NSQIP), obtained from over 600 hospitals between 2005 and 2014. As the NSQIP collects data from participating hospitals both within and outside the *USA*, to provide nationally validated, risk-adjusted outcomes of surgery, there is a possibility that the cohort reported by Siddique *et al.* may have encompassed some of the patients from the other American studies included in this review. However, as it was not possible to ascertain the individual data source from the NSQIP database and that not all participating hospitals were from the *USA*, the study by Siddique *et al.* was included in our meta-analysis as an independent study.

None of the studies reported the experience of surgeons involved in the parotid surgery.

4.4 Implications for clinical practice

Drain versus drain-less parotidectomy

The use of drains following parotid surgery varied in the studies included. Steckler *et al.* was one of the first to report outpatient parotidectomy in the early 1990s after the emergence of the practice of outpatient thyroidectomy¹⁵. In the majority of the studies included, the outpatient cohorts were discharged with a drain *in-situ* which was subsequently removed in an outpatient setting. Notably, Coniglio *et al.*¹⁷ reported a transition of practice from the regular insertion of neck drain to the routine practice of drainless parotidectomy in order to facilitate outpatient surgery. This was achieved by adopting different measures to reduce dead space such as partial or extracapsular dissection, primary SMAS repair with or without grafting material and the application of a gauze bolster and a jaw bra for 48 hours. Although none of the studies was set out to compare the outcomes on drain versus drain-less surgery, Coniglio *et al.*¹⁷ showed comparable outcomes in parotidectomy between the two groups. This finding echoes with the growing body of evidence that has demonstrated both the safety and feasibility of a drain-less approach in various head and neck procedures²¹⁻²⁵.

Cost analysis and patient satisfaction

There is evidence that there are significant cost savings with outpatient procedures due to the cost-intensive nature of longer hospital stays associated with inpatient parotidectomy. Steckler *et al.*¹⁵ reported savings of \$744 per case when performing a parotidectomy in an outpatient setting. In comparison, Bentkover *et al.*¹⁸ reported savings of \$196 per case. However, it is important to keep in mind that both studies were conducted in the 1990s and hospital costs will likely have increased since then. A more recent study by Ziegler *et al.*²⁰ showed that the average hospital cost was \$1,200 less and the profit was \$1,500 more, in the outpatient cohort. Considering the current climate of health care economics, cost-efficient surgery will remain an important topic, as the cost of medicine continues to increase.

Steckler *et al.*¹⁵ reported an almost “uniform patient satisfaction” with outpatient parotidectomy. Similarly, Bentkover *et al.*¹⁸ reported high patient satisfaction in both groups with the satisfaction being slightly higher in the inpatient cohort. Although only limited amount of evidence is available concerning patient satisfaction, these results suggest that with appropriate patient selection and education, outpatient parotidectomy can be well received by patients as an alternative to the inpatient option.

5) Conclusions

Overall, our study showed that outpatient (or same-day discharge) parotidectomy has comparable post-operative complication and readmission rates as to inpatient procedures. By employing suitable criteria for patient selection and discharge planning, outpatient procedure offers a safe and cost-effective alternative for patients who require parotid surgery.

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Table 1: Inclusion and exclusion criteria.

Criteria	Inclusion	Exclusion
Time period	No date restrictions	None
Language	English	Non-English
Age	Adults (>18 years)	Children
Article type	All primary literature sources	Secondary literature
Study characteristics	Studies that included parotidectomies as inpatient and outpatient procedure.	Studies that did not include parotidectomies. Studies that included only inpatient or outpatient cohorts.

Table 2: Studies included in the systematic review

Study	Year and Country	Study design	Total number of patients		Newcastle-Ottawa Scale (Max score = 9)	Outpatient			Inpatient		
			Outpatient	Inpatient		Mean age	ASA	Surgery type	Mean age	ASA	Surgery type
Coniglio <i>et al</i> ¹⁷	2019, USA	Retrospective series	42	49	8	55.2±14.57	NR	Superficial parotidectomy	52.9±16.7	NR	Adapted partial parotidectomy technique
Siddiqui <i>et al</i> . ¹⁶	2018, USA	Multi-institutional retrospective series	1352	1352	8	NR	1 and 2: 63.1% 3 and 4: 36.9%	Total or superficial parotidectomy	NR	1 and 2: 64.6% 3 and 4: 35.4%	Total or superficial parotidectomy
Ziegler <i>et al</i> ²⁰	2018, USA	Retrospective series	90	478	7	55.22±14.57	2.19	Total or superficial parotidectomy	52.9±16.7	2.2	Total or superficial parotidectomy
Van Horn <i>et al</i> ¹⁹	2017, USA	Retrospective series	99	116	6	52.396	NR	Total or superficial parotidectomy	52.4	NR	Total or superficial parotidectomy
Bentkover <i>et al</i> ¹⁸	1996, USA	Retrospective series	19	13	8	51.6	1.95	Total or superficial parotidectomy	58.5	2.5	Total or superficial parotidectomy
Steckler <i>et al</i> ^{15†}	1991, USA	Retrospective series	44	10	4	48.0	NR	Parotidectomy (not specified)	48.0	NR	Parotidectomy (not specified)

NR = Not reported

† Not included in meta-analysis

Table 3. Data on clinical outcomes

Authors	Bleeding/ Haematoma		Surgical Site Infection (S = superficial; D = Deep)		Seroma		Facial weakness (T = Transient; P = Permanent)		Frey's syndrome		Readmission	
	OP	IP	OP	IP	OP	IP	OP	IP	OP	IP	OP	IP
Coniglio <i>et al.</i> ¹⁷	0 (0%)	0 (0%)	1 (2.4%)	1 (2.0%)	4 (9.5%)	2 (3.8%)	3 (7.1%)	8 (16.3%)	0 (0%)		NR	
Siddiqui <i>et al.</i> ¹⁶	0 (0%)	1 (0.07%)	21 (1.6%) S 3 (0.2%) D	31 (2.3)% S 5 (0.4%) D	NR		NR		NR		18 (1.3%)	30 (2.2%)
Ziegler <i>et al.</i> ²⁰	1 (1.1%)	33 (6.9%)	4 (4.4%)	12 (2.5%)	2 (2.2%)	13 (2.7%)	NR		NR		0 (0%)	7 (1.5%)
Van Horn <i>et al.</i> ¹⁹	3 (3.0%)	3 (2.6%)	NR		3 (3.0%)	18 (15.5%)	1 (1.0%)	3 * (2.6%)	NR		NR	
Bentkover <i>et al.</i> ¹⁸	NR		NR		3 (15.8%)	1 (7.7%)	2 (11%) T 0 (0%) P	1 (8%) T 2 (15%) P	0 (0%)	1 (7%)	NR	
Steckler <i>et al.</i> ¹⁵ †	2 (20%)		NR		NR		6 (11%) T 0 (0%) P		NR		NR	

NR = Not reported

* Facial weakness resulted from facial nerve sacrifice

† Not included in meta-analysis

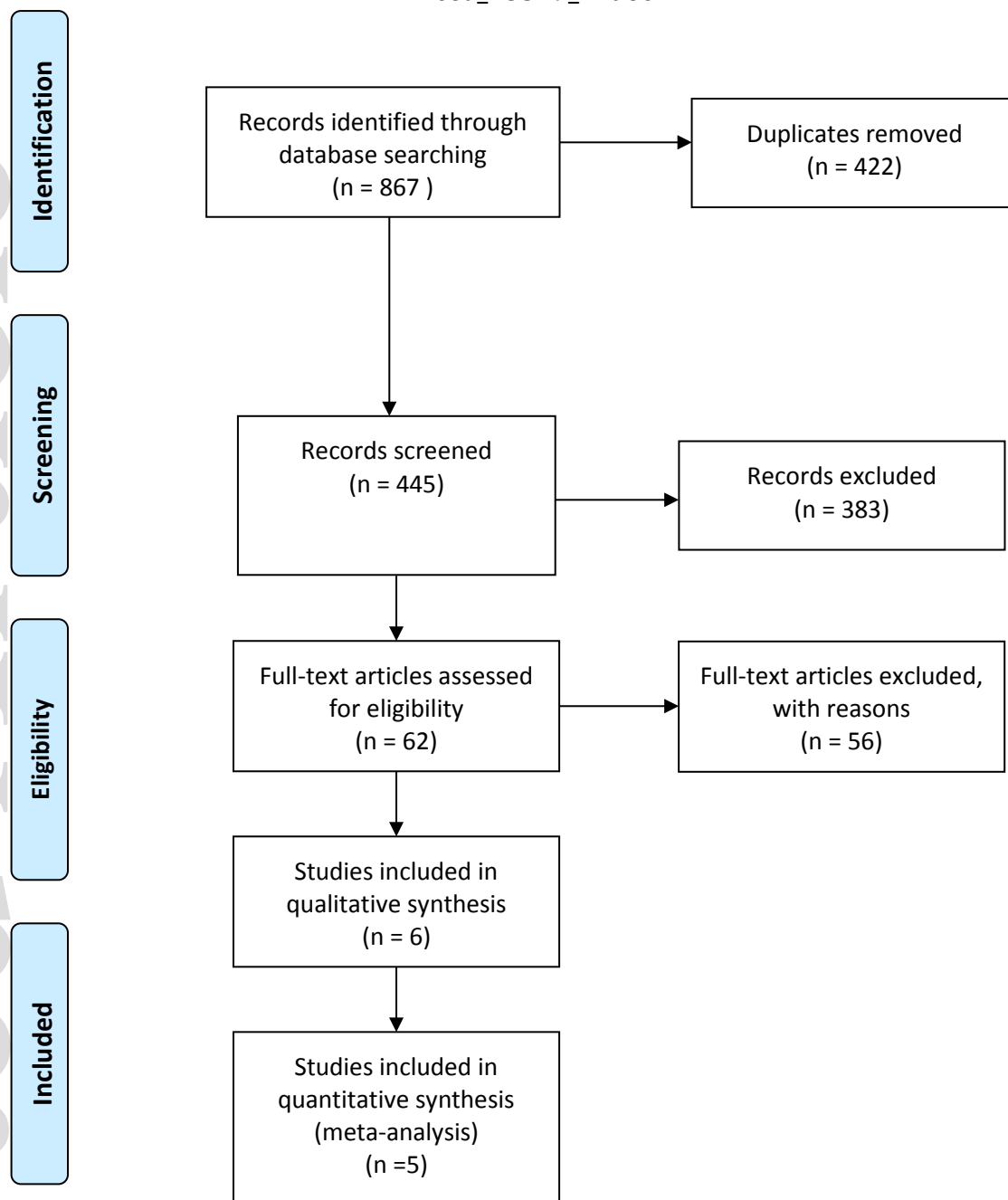


Figure 1: Study selection process in the PRISMA flow chart

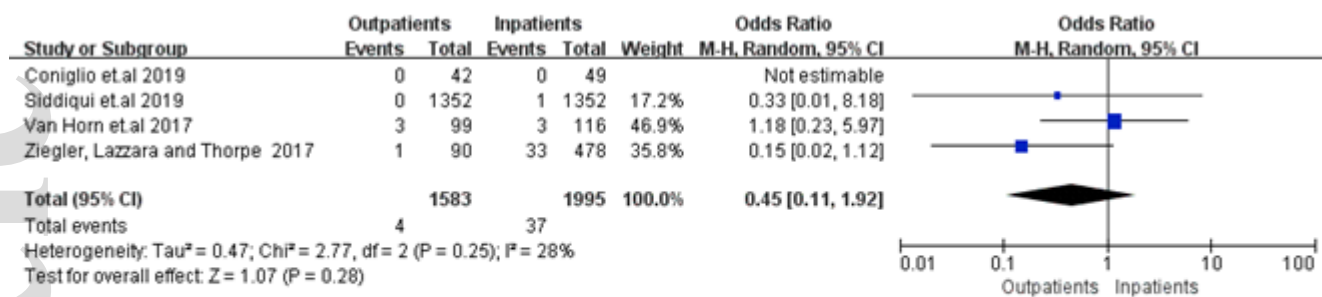


Figure 2 – Meta-analysis regarding risk of haematoma

coa_13519_f2.tif

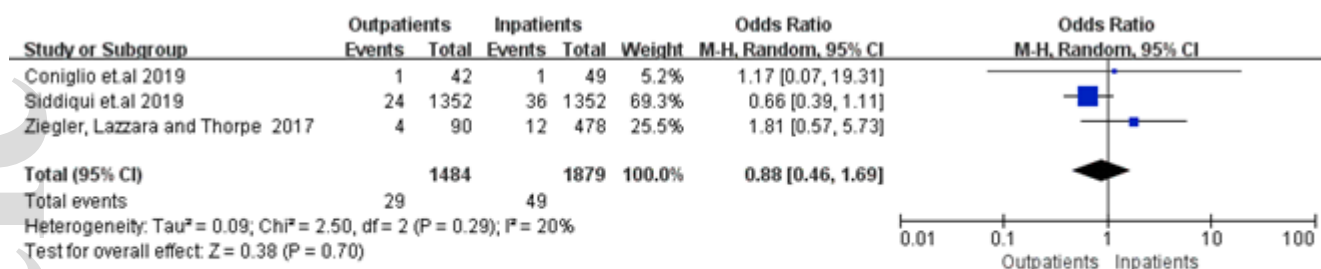


Figure 3 – Meta-analysis regarding risk of surgical site infection

coa_13519_f3.tif

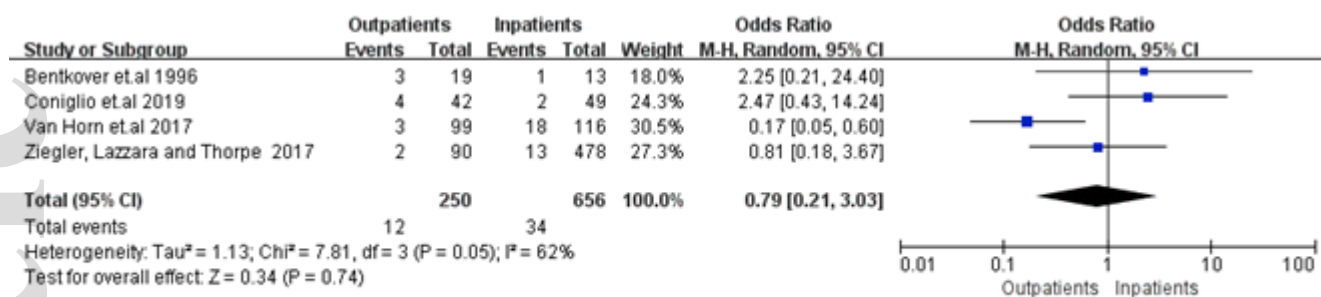


Figure 4 – Meta- analysis regarding risk of seroma

coa_13519_f4.tif

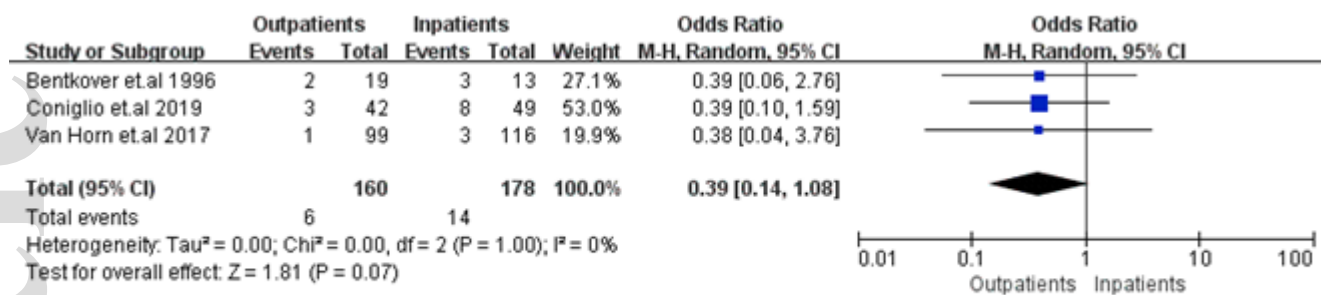


Figure 5 – Meta-analysis regarding risk of facial nerve weakness

coa_13519_f5.tif

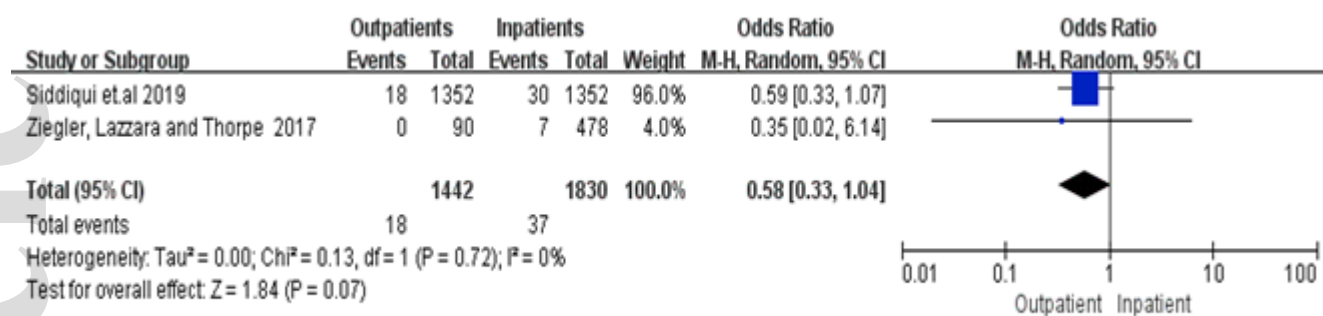


Figure 6 – Meta-analysis regarding risk of readmission

coa_13519_f6.tif